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Evaluation of EGM2008 Earth Gravitational Model in Algeria using gravity and GPS/levelling data

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The present work focuses on the evaluation of the EGM2008 geopotential model that was recently released by the NGA (National Geospatial-Intelligence Agency, U.S)/EGM-development team, in Algeria using the free air gravity anomalies supplied by BGI and GETECH, some of the precise GPS data collected from the international TYRGEONET (TYRhenian GEOdynamical NETwork) and ALGEONET (ALGerian GEOdynamical NETwork) projects and the last Algerian local gravimetric geoid model. Additional comparisons of the terrestrial point data with the corresponding values obtained from other geopotential models were made. Five global geopotential models were used in this comparison: the Preliminary Earth Gravitational Model PGM2007A, the combined CHAMP and GRACE model EIGEN-CG01C, the combined GRACE and LAGEOS model EIGEN-GL04C, OSU91A and EGM96.

The study shows that all tested models are an improvement over OSU91A geopotential model used in all previous Algerian geoid computations and that new released combined model (EGM2008) is relatively superior to other tested models in the Algerian region. According to our numerical results, the new EGM2008 model fits better the observed values used in this investigation. Its standard deviations fit with GPS/levelling data are 21.4cm and 18.7cm before and after fitting using four-parameters transformation model. We strongly recommend the use of this new model in the remove-restore technique for the computation of the improved geoid for Algeria.

In addition to these more general investigations, special GPS campaign has been performed for altimetric auscultation of a storage tank in which we wanted to test the possibilities to replace levelling by GPS measurements. The evaluation revealed promising results but also that much attention has to be paid on the GPS evaluation method.

Key words: Geopotential model, TYRGEONET and ALGEONET projects, GPS/levelling data.